PHOENIX FIRE CODE SUMMARY

Generator Sub-Base Aboveground Storage Tanks

REFERENCE FIRE CODE SECTION	1997 Uniform Fire Code, Articles 79 & 80, as adopted and amended by the City of Phoenix.
SCOPE OF THIS FIRE CODE SUMMARY	An explanation of the hazards of combustible liquid storage and the City of Phoenix requirements for constructing, installing and operating a generator sub-base tank installed at grade outside of a building. THIS SUMMARY DOES NOT ADDRESS THE INSTALLATION OF TANKS INSIDE OF OR ON THE ROOF OF BUILDINGS.

HAZARDS OF FUEL STORAGE

The primary hazards of any aboveground fuel storage are ensuring that the system is liquid tight and that the storage tank is properly constructed. The violations most commonly identified are aboveground fuel storage tanks (ASTs) that are not equipped with the proper emergency venting or the AST is not listed. An AST without an emergency vent represents a serious risk to firefighters because if the tank is subjected to the energy of a pool or exposure fire, a pressure explosion could result. Statistically, each incident of tank explosions reviewed by Phoenix Fire Department resulted in the death of at least 2 firefighters.

COMMONLY USED HAZARDOUS MATERIALS AND THEIR CLASSIFICATION

Diesel fuel is the fuel used to power the engine. Diesel fuel is assigned Chemical Abstract Service (CAS) Number 62435-54-2 and is classified as a Class II Combustible Liquid. Diesel fuel has the following NFPA 704 hazard ratings: Health: 1, Flammability: 2, Reactivity: 0, Special Hazards: Blank.

SUMMARY OF FIRE CODE REQUIREMENTS

1. **Phoenix Fire Code Requirements.** Article 79 of the Phoenix Fire Code has requirements for the storage and handling of Class II Combustible Liquids. The following summarizes the requirements for the construction and installation of the fuel tank and piping system.

   1.1. **Fuel Storage Tank - Construction**

      1.1.1. The tank shall be bear a permanent nameplate or marking indicating the standard used as a basis for design. At a minimum, atmospheric storage tanks shall be labeled as being constructed using Underwriters Laboratories 142, Standard for the Construction for Steel Flammable & Combustible Liquid Storage Tanks. (PFC 7902.1.8.2.1)

      1.1.2. Tanks constructed with integral secondary containment shall be listed as meeting UL 142. (PFC 7902.1.8.2.1)

      1.1.3. The tank nameplate shall state the required flow rate for the emergency vent. If a tank is constructed with integral secondary containment, the nameplate shall indicate the required flow rate for the primary and secondary containment tank. (UL 142, Section 43.6).

   1.2. Fuel Storage Tank – Secondary Containment

      1.2.1. Secondary containment is required when a stationary AST is installed outside of a building.

1.2.2. The permit applicant shall submit plans for the secondary containment system to PFD that demonstrate the design meets UFC 7902.2.8.1. (PFC 7901.3.2)

1.2.3. Tanks labeled as either "Single Wall" or "Generator Sub-Base Tank" are single-wall tanks and require secondary containment. Provide secondary containment for the generator sub-base tank (PFC 7902.2.8.1.)

(NOTE: Tanks labeled as Open-Top Diked Tanks, Closed Top Diked Tanks or Secondary Containment Tanks do not require secondary containment. See PFC 7902.2.8.1, Exception 2.)

1.3. Fuel Storage Tank – Normal Vent

1.3.1. The tank normal vent shall be terminated outside of the building. The vent shall be terminated at least 12 feet above grade, 5 feet from property lines and 5 feet from building openings. (PFC 7902.1.11.4)

1.3.2. Normal vents shall be installed so they will drain toward the tank without traps in which liquids can collect. The normal vent shall not be subject to physical damage or vibration.

1.3.3. The minimum required diameter of a normal vent is 1 ¼ -inch. (PFC 7902.1.11.7)

1.4. Fuel Storage Tank – Emergency Vent

1.4.1. An emergency vent shall be provided for the primary tank and when provided, the secondary containment tank. (PFC 7902.2.6.1)

1.4.2. Emergency vents shall be the commercially produced type that is stamped at the factory to indicate its flow rate and opening pressure.

(NOTE: The tank manufacturer can fabricate emergency vents specifically designed for the each model of tank fabricated. The PFC requirements for these emergency vents are fairly detailed and have extensive testing requirements. See PFC 7902.2.6.4.2)

1.4.3. The flow rate of the emergency vent shall at equal or exceed the flow rate specified on the tank nameplate. (PFC 7902.2.6.3.2)

1.4.4. In instances where the tank manufacturer desires to use the flow rate of the normal and the emergency vent to satisfy the minimum emergency vent flow rate, the normal vent shall be stamped to indicate its flow rate. (PFC 7902.2.6.3.1)

1.5. Fuel Storage Tank – Tank Openings Other Than Vents

1.5.1. For top-loaded tanks, a metallic fill pipe fill pipe shall be installed to minimize the generation of static electricity by terminating the pipe within 6-inches of the bottom of the tank, and shall be installed in such a manner that avoids excessive vibration. (PFC 7902.1.13.1.1)

1.5.2. Tanks installed outside of buildings that have a volume of 500 gallons or more shall be equipped with a positive means of overfill protection. (PFC 8003.1.5)

1.6. Fuel Storage Tank – Location

1.6.1. The location of generator sub-base fuel storage tanks that are listed as meeting UL 142 shall meet the distance requirements in PFC Table 7902.2-F (PFC 7902.2.2.2):

Tank Volume (Gallons)	Minimum Distance from Property Line of Property Which Is or Can Be Built Upon, Including the Opposite Side of a Public Way (Feet)	Minimum Distance From Nearest Side of Any Public Way or From the Nearest Important Building On the Same Property (Feet)
275 gallons or less	5	5
276 to 750	10	5
751 to 12,000	15	5

1.6.2. If these separation distances cannot be satisfied, the Phoenix Fire Department permits the use of Protected ASTs that are listed as meeting UL 2085, Protected Aboveground Storage Tanks for Flammable and Combustible Liquids. ASTs that are listed as meeting UL 2085 and installed in accordance with PFC 7902.1.11.8.5 can have separation distances reduced by 50 percent.

1.7. Fuel Storage Tank – Support Columns

1.7.1. If the fuel tank is located outside the building and is elevated more than 12 inches above grade, fire protection for the columns is required. When fire resistive assemblies are used, they shall meet ASTM E-1529, Standard Test Method for Determining Effects of Large Hydrocarbon Pool Fire on Structural Members and Assemblies. (PFC 7902.1.14.4)

1.8. Other PFC Requirements

1.8.1. The tank cannot be filled or placed in service until it is inspected and approved by the Phoenix Fire Department **AND** the owner has obtained a Flammable/Combustible Liquids Storage, Handling and Use permit.

1.8.2. Provide Phoenix Fire Department approved signs that indicate the contents of generator sub-base fuel storage tank. (PFC 7901.9.3)

1.8.3. Provide impact protection if the above ground storage tank is located in an area subject to vehicle traffic. (PFC 8001.11.3)

REQUIRED FIRE CODE PERMITS

The following permits are required for fuel storage tanks that supply diesel generators:

- A PFD construction permit is required when installing an aboveground storage tank. Before this permit can be issued, a minimum of two sets of tank shop drawings and site plans shall be submitted to the Fire Department for review and approval. The plan review fee is $200 and the construction permit fee for one tank is $450.00. (PFC 105.8)
- The building owner or tenant is required to obtain a Flammable/Combustible Liquids Storage, Handling and Use permit. The permit application and Hazardous Materials Inventory Statement is available at Fire Department Headquarters, Fire Prevention Division located at 150 S. 12th Street. The permit application and fee schedule is available on-line at www.phoenix.gov/fire/ and click on “Hazardous Materials Application.” (PFC 105.8, permit f.3)

- The following is the permit fee and the annual assessment fee for Flammable/Combustible Liquids Storage, Handling and Use permits issued to owners of ASTs that contain Class I, II or III-A liquids:

Number of Tanks	Annual Assessment Fee
1	$550.00
2 or more	$550.00 + $125.00 for each additional tank

OTHER REQUIRED CITY OF PHOENIX PERMITS

A generator set that is connected to a building's electrical system requires a plan review and construction permit issued by the Development Services Department.

The fee for the construction permit is calculated using the value of the project, building, or area. To obtain an accurate fee calculation, contact the Development Services Department Business Customer Service Center at 602-534-2000.

HOW CAN I OBTAIN MORE INFORMATION?

If this fire code summary does not answer your questions, please feel free to contact one of the Phoenix Fire Department's fire protection engineers or fire plan examiners at 602-262-6771. E-mail inquires can be sent to phoenix.fire.prevention@phoenix.gov

Requests for information about Building, Plumbing, Mechanical and Electrical Code requirements should be directed to the Development Services Department at 602-534-2000.

Telephony or e-mail messages regarding particular code requirements to the Phoenix Fire Department are not official interpretations. An official interpretation requires a plan review or written correspondence that requests an official interpretation, the referenced code section(s) **AND** includes sufficient information to interpret if the applicable code section(s) applies.

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